

**Amendment and Response**

Applicant: Ronald A. Askeland et al.

Serial No.: 10/066,529

Filed: January 31, 2002

Docket No.: 100201207-1

Title: ESTIMATING LOCAL EJECTION CHAMBER TEMPERATURE TO IMPROVE PRINTHEAD PERFORMANCE

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**REMARKS**

The following Remarks are made in response to the Non-Final Office Action mailed May 18, 2005, in which claims 1-12 and 21-30 were rejected. With this Amendment, claims 1, 2, 12, 23, 26, and 29 have been cancelled without prejudice, claims 31-32 have been added, and claims 3, 6, 8, 9, 21, 22, 24, 25, 27, 28, and 30 have been amended, including claims 24, 27, and 30 which have been rewritten in independent form. Claims 3-11, 21, 22, 24, 25, 27, 28, and 30-32, therefore, remain pending in the application and are presented for reconsideration and allowance.

**Claim Rejections - 35 U.S.C. § 112**

Claims 23-24, 26-27, and 29-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. More specifically, the Examiner contends that the claims contain subject matter which was not described in the Specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant respectfully traverses this rejection.

Applicant submits that the subject matter "wherein the ejection history of the ejection elements identifies whether the ejection elements have been fired and whether the ejection elements have not been fired," as recited in claims 23, 26, and 29, is supported by the Specification, and that the subject matter "wherein the thermal response model of the printhead includes a first set of parameters when the ejection elements have been fired and a second set of parameters when the ejection elements have not been fired," as recited in claims 24, 27, and 30, is supported by the Specification.

For example, page 6, lines 10-12 of the Specification describe that "[p]rinthead memory device 122 is used to store data regarding the operation of printhead 116 such as...the ejection history of the ejection elements 142." In addition, page 15, lines 9-15 of the Specification describe that "[t]he ejection history of the ejection elements 142 or groups of ejection elements can be used in conjunction with the temperature sensors 140 to better estimate the true temperature of different regions of the driver head 126. When the driver head 126 is printing, the temperature sensors 140 will always heat

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more slowly than the ejection chambers and read a temperature that is lower than the temperature of the ejection chambers. Likewise, when the driver head 126 stops firing, the TSR temperature drops more slowly than the ejection chamber temperature and thus reads artificially high." Furthermore, page 15, lines 17-26 of the Specification describe that "since the primary source of heat in a driver head 126 is the firing of ejection elements, a thermal control algorithm is used that has one set of parameters when the driver head 126 has been printing, and thus being heated, and another set of parameters when the driver head 126 has not [been] printing. Since the printing state can be captured instantaneously from the data stream to the driver head 126 and printhead assembly memory 122, the latency associated with temperature measurement can be avoided and the printing system can respond more quickly. Maintaining a *[sic]* ejection history of small groups of ejection elements 142 and using that ejection history in conjunction with the temperature sensors 140 creates a running estimate of the actual temperature distribution across the driver head 126, thus allowing optimized energy delivery to each ejection element 142."

In view of the above, Applicant submits that the subject matter of claims 23-24, 26-27, and 29-30 is described in the Specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant, therefore, respectfully requests that the rejection of claims 23-24, 26-27, and 29-30 under 35 U.S.C. 112, first paragraph, be reconsidered and withdrawn and that claims 24, 27, and 30 be allowed.

**Claim Rejections - 35 U.S.C. § 102 and 35 U.S.C. § 103**

Claims 1-3, 23, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith et al. U.S. Patent No. 4,791,435. Claims 4-12, 21-22, 25, and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. U.S. Patent No. 4,791,435 in view of Prakash et al. U.S. Patent No. 6,302,507.

With this Amendment, claims 1, 2, 12, 23, 26, and 29 have been cancelled without prejudice. The rejections of claims 1, 2, 12, 23, 26, and 29, therefore, are rendered moot.

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With this Amendment, claims 24, 27, and 30 have been rewritten in independent form and each recite that "the thermal response model of the printhead includes a first set of parameters when the ejection elements have been fired and a second set of parameters when the ejection elements have not been fired."

With respect to the Smith et al. and Prakash et al. patents, neither of these patents, individually or in combination, teach or suggest a printhead temperature control system as claimed in independent claim 24, a method of controlling a temperature of a printhead having a plurality of ejection elements as claimed in independent claim 27, nor a method of controlling a temperature of a printhead having a plurality of ejection elements energizable by an electrical pulse having an amplitude and a pulse width as claimed in independent claim 30.

In view of the above, Applicant submits that independent claims 24, 27, and 30 are each patentably distinct from the Smith et al. and Prakash et al. patents and, therefore, are each in a condition for allowance. Furthermore, as dependent claims 3-11 and 25 further define patentably distinct claim 24, dependent claim 28 further defines patentably distinct claim 27, and dependent claims 21 and 22 further define patentably distinct claim 30, Applicant submits that these dependent claims are also in a condition for allowance. Applicant, therefore, respectfully requests that the rejections of claims 1-3, 23, and 26 under 35 U.S.C. 102(b) and claims 4-12, 21-22, 25, and 28-29 under 35 U.S.C. 103(a) be reconsidered and withdrawn and that claims 3-11, 21, 22, 24, 25, 27, 28, and 30 be allowed.

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**CONCLUSION**

In view of the above, Applicant respectfully submits that pending claims 3-11, 21, 22, 24, 25, 27, 28, and 30-32 are all in a condition for allowance and requests reconsideration of the application and allowance of all pending claims.

Any inquiry regarding this Amendment and Response should be directed to either James R. McDaniel at Telephone No. (208) 396-4095, Facsimile No. (858) 655-5859 or Scott A. Lund at Telephone No. (612) 573-2006, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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Respectfully submitted,

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**CERTIFICATE UNDER 37 C.F.R. 1.8:** The undersigned hereby certifies that this paper or papers, as described herein, are being facsimile transmitted to the United States Patent and Trademark Office, Fax No. (571) 273-8300 on this 28<sup>th</sup> day of July, 2005.

  
By \_\_\_\_\_  
Name: Scott A. Lund